The citation for Professor Carl Edwin Wieman, the recipient of the University of Macau's doctoral degree, *honoris causa*

In the world of quantum, even what appears as a common phenomenon could just mind-blowingly take a bizarre course. Fluid is a case in point. It's just a matter of common sense that a container holds fluid – well, should we say, the fluid *is held* therein. But watch out! There is a 'fugitive' fluid which, because of its zero viscosity, can 'scale' its way out of the vessel without any resistance! It is called 'superfluid' – the Bose-Einstein condensate (BEC) resulting from a quantum liquid cooled to a temperature lower than a certain critical point. In the beginning of the 1920s, Satyendra Nath Bose and Albert Einstein theorized about the existence of such a state of the matter. However, it was not able to bear that out until 70 years later in 1995 when a breakthrough was made: Professor Wieman and his research team ingeniously devised the magneto-optical trap technology, cooling a rubidium atomic gas to billionths of the absolute temperature (absolute zero equals –273.15 degrees Celsius). When a rubidium atomic gas reached the state of superfluid, its nature became very different from those commonly seen clusters formed by individual atoms. This was a new state of matter in which the features of a single atom were lost, just as the photons lost their own characteristics in laser. Because of this discovery, Professor Wieman received the Nobel Prize in Physics jointly with Wolfgang Ketterle and Eric Cornell in 2001.

Professor Wieman was born in Corvallis, Oregon in 1951. He obtained a B.Sc. degree from the Massachusetts Institute of Technology in 1973 and a Ph.D. degree from Stanford University in 1977 where he is currently a professor at the Department of Physics and at the Graduate School of Education. He played a major part in laying the foundation for atomic physics as we know it today. When he was young, he cut his teeth on pioneering research on elementary particle physics which included precision laser spectroscopy, using lasers and atoms to conduct important tests of theories of elementary particle physics, the understanding of how atoms interact with one another and light at ultra-cold temperatures, etc. His ground-breaking research bespeaks his razor-sharp intellect while his significant contributions to physics and science education justify his guru-status in these fields. He tucked under his belt the National Science Foundation's Director's Award for Distinguished Teaching Scholar, the Carnegie Foundation's U.S. Professor of the Year Award, the American Association of Physics Teachers' Oersted Medal, and many more. Devoting his prize money to science education, Professor Wieman reconstructed a science education system that is more effective and practical-oriented. In doing so, he re-defined evidence-based science

education from a new perspective.

Professor Wieman is a member of the National Academy of Science (NAS) and the American Academy of Arts & Sciences. He was appointed as associate director for Science in the White House Office of Science and Technology Policy in 2010. It is not overstating to say that not many others may have all these attributes combined in them – distinguished achievements, social influence and strong leadership – as Professor Wieman does. His works are ground-breaking and his aim is laudable as he avails of his outstanding scholarship to make a better future for the world.

For this university, we are pursuing top-class scientific research aiming at practical application. We are adopting a holistic education through a multi-pronged approach to nurture innovative minds. All this forms the warp and woof of our educational ideal. Therefore the presentation of this honorary degree comes never more timely when we need somebody of Professor Wieman's caliber to steer us forward in scientific research and science education on the one hand and inspire students on the other.

In recognition of his accomplishments and contributions, may we therefore call upon the Chair of the University Council to confer upon Professor Carl Edwin Wieman the Doctor of Sciences *honoris causa*?